



California leaf-nosed bat
(*Macrotus californicus*)

Bat inventory of the San Diego County MSCP area

Background

- 23 bat species in San Diego County (Krutzsch 1948, Bond 1977, Constantine 1998)
- 21 insectivores, 2 nectivores
- 1 federally endangered species, 15 others state and/or federally sensitive
- No MSCP covered species (lack of info.)
- Extensive bat surveys in 1930's and 40's by Krutzsch (1948)
- Current information on bat distribution, status lacking
- Complex life histories, require multiple habitats for both roosting and foraging needs, typically have large home ranges

Mexican long-tongued
bat (*Choeronycteris*
mexicana)



Objectives

- Determine species composition and distribution
- Determine conservation needs of bats
- Develop effective survey/monitoring strategies (techniques, timing of surveys, locations)
- Assess functionality of MSCP area for bats
- Develop management strategy for bats

USGS biologists
processing captured
bats

Methods



- Foraging bat surveys

- Anabat II Bat Detector/laptop computer
- Mist-nets
- Audible
- Visual (spotlighting)
- 3-hour survey period starting at sunset

- Roosting bat surveys

- Diurnal & nocturnal surveys
 - Visual
 - Hand-nets
- External surveys
 - Anabat
 - Mist-nets
 - Visual
 - Audible

Captured Bats

- Species ID
- Age
- Sex
- Repro. status
- Measurements
 - Forearm
 - Ear
 - Foot
 - Weight
- Ectoparasite load
- Obvious injuries
- Genetic material
- Record vocalization



California myotis (*Myotis californicus*)

Townsend's big-eared bat
(*Corynorhinus townsendii*)



Site Selection

■ Foraging Sites

- Open water
- Riparian scrub
- Riparian forest
- Oak woodland
- Chaparral
- Coastal Sage Scrub
- Grassland

■ Roosting sites

- Rocky outcrops
- Natural caves
- Flumes
- Buildings
- Bridges

Long-eared myotis
(*Myotis evotis*)



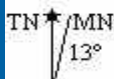
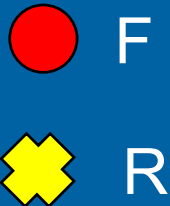
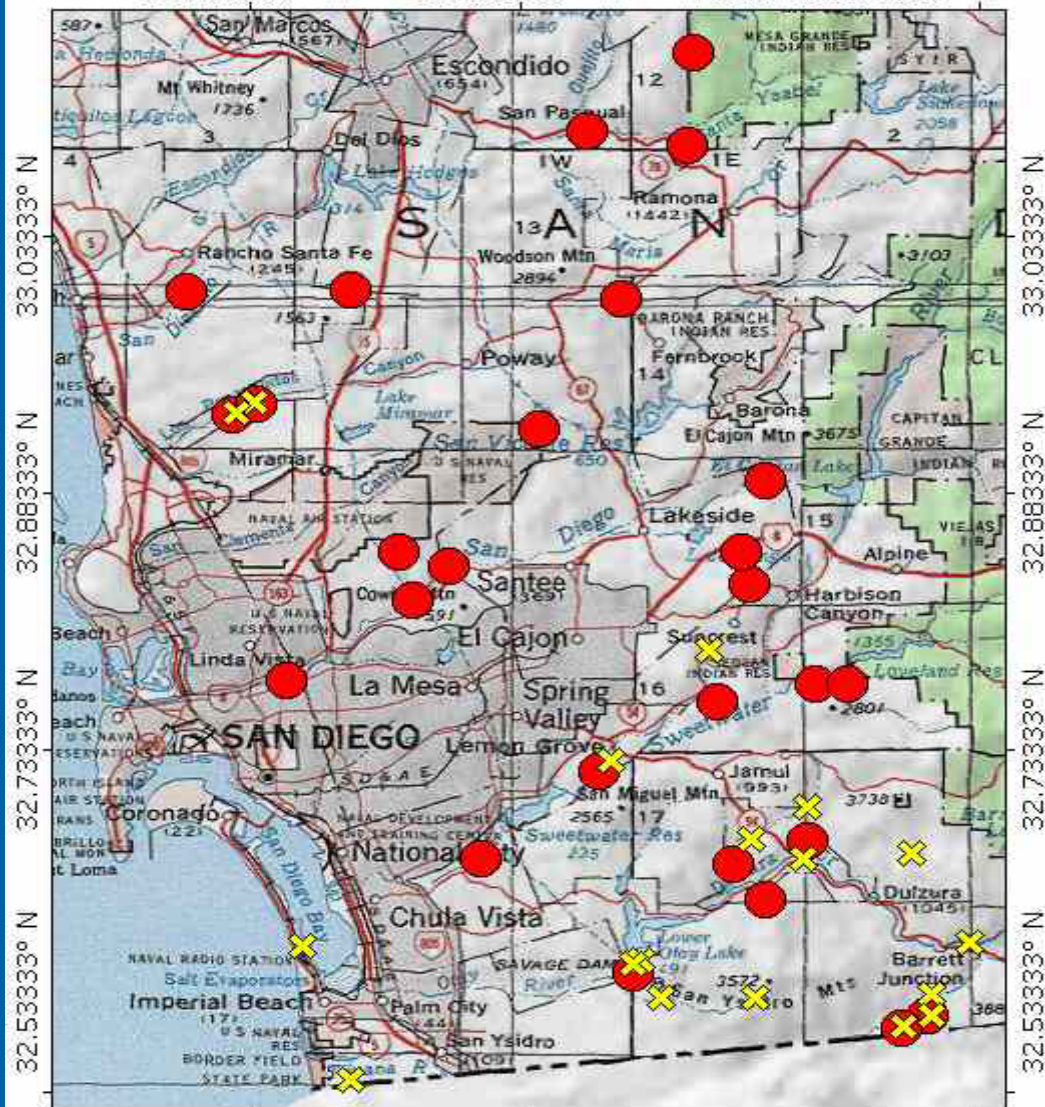
Survey Effort

- Foraging bats
 - 80 nights at 27 sites
 - 240 Anabat hours
 - 840 Mist-net hours
- Roosting bats
 - 28 visits to 18 potential roost sites

Surveys conducted year-round, most effort May-October

TOPO! map printed on 04/16/04 from "mscpbatsites.tpo"

117.16667° W 117.00000° W WGS84 116.71667° W



117.16667° W 117.00000° W WGS84 116.71667° W
0 5 10 15 20 25 miles
0 5 10 15 20 25 30 35 40 km

Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Results

- Foraging bats
- 14 bat species detected
- 5.35 species/night
- Anabat: 8697 recorded files (108.71 files/night), 14 species recorded (4.83 species/night)
- Mist-nets: 143 bats (1.79 bats/night) representing 10 species (0.76 species/night)



- Roosting bats
- 13 species found during roost surveys including 2 species not detected during foraging bat surveys
- Bats found occupying 15 of 18 surveyed roosts

Results (cont.)

- 16 species total
- 15 of 16 species found in southern portion of MSCP area (TJ, Otay Rivers)
- 3 most frequently detected species: Yuma myotis, Pocketed free-tailed bat, Mexican free-tailed bat
- 3 least frequently detected species: Mexican long-tongued bat, California leaf-nosed bat, Pallid bat



Yuma myotis (*Myotis yumanensis*)

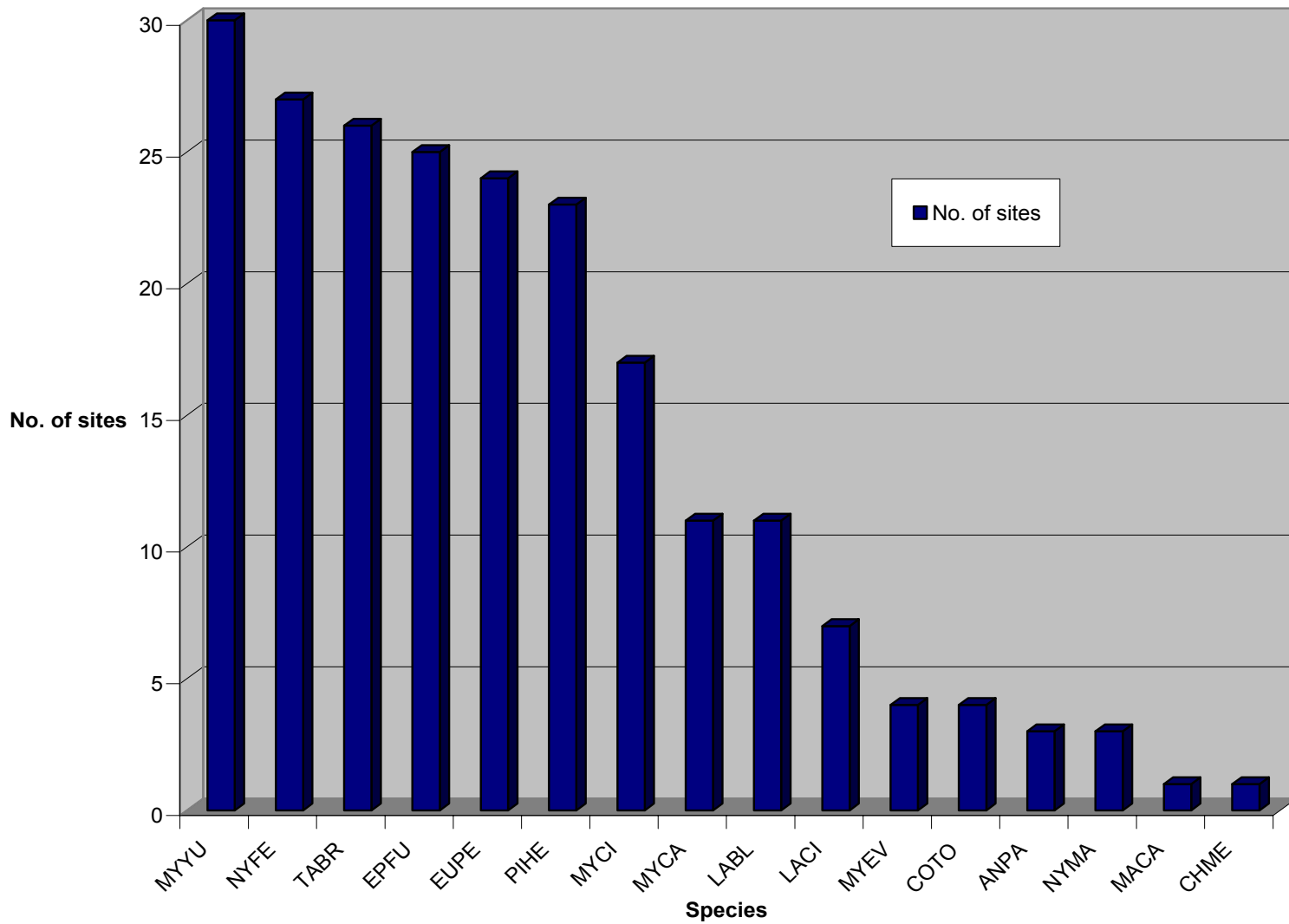
Bat Species (23 known from San Diego County)			Legal Status*
Family	Scientific name	Common name	CSC, FSS, BLM
Phyllostomatidae	<i>Macrotus californicus</i>	California leaf-nosed bat	CSC, FSS, BLM
	<i>Choeronycteris mexicana</i>	Mexican long-tongued bat	CSC
	<i>Leptonycteris curasoae</i>	Lesser long-nosed bat	FE
Vespertilionidae	<i>Myotis yumanensis</i>	Yuma myotis	BLM
	<i>Myotis lucifugus</i>	Little brown bat	none
	<i>Myotis evotis</i>	Long-eared myotis	BLM
	<i>Myotis thysanodes</i>	Fringed myotis	BLM
	<i>Myotis volans</i>	Long-legged myotis	CSC**, BLM
	<i>Myotis californicus</i>	California myotis	none
	<i>Myotis ciliolabrum</i>	Small-footed myotis	BLM
	<i>Lasionycteris noctivagans</i>	Silver-haired bat	none
	<i>Pipistrellus hesperus</i>	Western pipistrelle	none
	<i>Eptesicus fuscus</i>	Big brown bat	none
	<i>Lasiurus blossevillii</i>	Red bat	CSC**, FSS
	<i>Lasiurus xanthinus</i>	Yellow bat	CSC**
	<i>Lasiurus cinereus</i>	Hoary bat	none
	<i>Euderma maculatum</i>	Spotted bat	CSC, BLM
Molssidae	<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	CSC, FSS, BLM
	<i>Antrozous pallidus</i>	Pallid bat	CSC, FSS, BLM
	<i>Tadarida brasiliensis</i>	Mexican free-tailed bat	none
	<i>Nyctinomops femorosaccus</i>	Pocketed free-tailed bat	CSC
	<i>Nyctinomops macrotis</i>	Big free-tailed bat	CSC
	<i>Eumops perotis</i>	Western mastiff bat	CSC, BLM

*California Species of Special Concern (CSC), Federally Endangered (FE), Forest Service Sensitive (FSS), and Bureau of Land Management Sensitive (BLM).
Source: Calif. Dept. of Fish and Game, Special Animals List, July 2002.
**Proposed California Species of Special Concern



 Detected bat species

Bats by site (45 sites)



Bats by watershed*

Watershed	Species															No. of Species
	EPFU	EUPE	LABL	LACI	MYCA	MYYU	TABR	MYCI	NYFE	PIHE	COTO	NYMA	MYEV	ANPA	MACA	
Tijuana River																14
Otay River																13
Sweetwater River																13
San Diego River																11
San Dieguito River																11
Penasquitos Creek																7
No. of Watersheds	6	6	6	6	6	6	6	5	5	5	3	3	2	2	1	

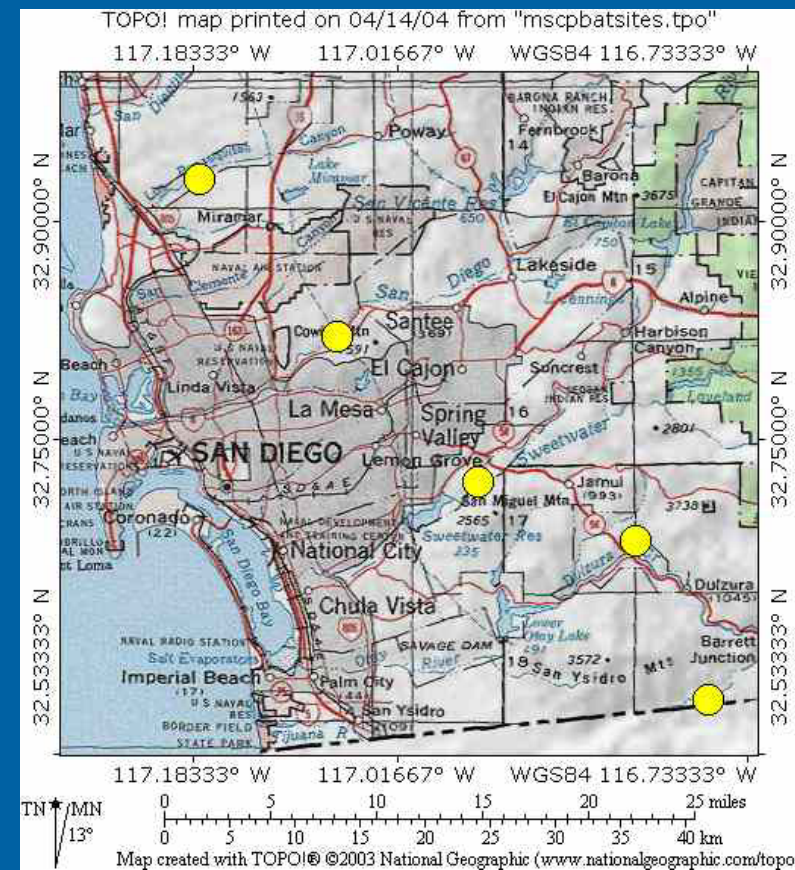
*survey effort varied from watershed to watershed

Bats by month*

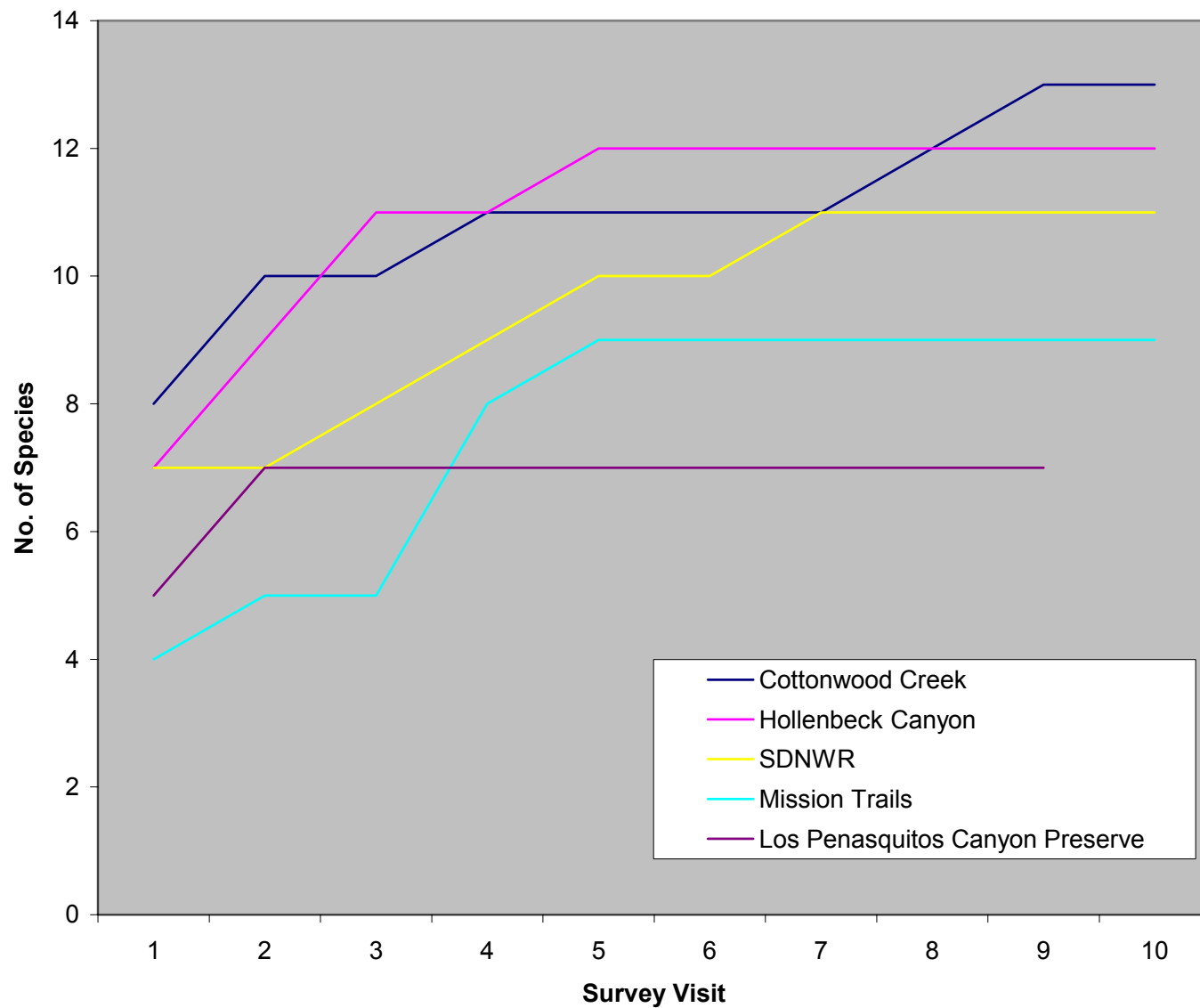
Month	Seasonal Detectability															
	year-round					spring-fall					fall-spring					
	Species															
	MYYU	NYFE	TABR	PIHE	EUPE	LABL	MYCA	MYCI	EPFU	MYEV	COTO	ANPA	LACI	NYMA	CHME	MACA
January																
February																
March																
April																
May																
June																
July																
August																
September															X	
October															X	
November																
December																

Multi-visit Survey Sites (Foraging Sites)

- Los Penasquitos Canyon Preserve
- Mission Trails Regional Park
- San Diego National Wildlife Refuge
- Hollenbeck Canyon Wildlife Area
- Cottonwood Creek



Species accumulation curves for multi-visit sites

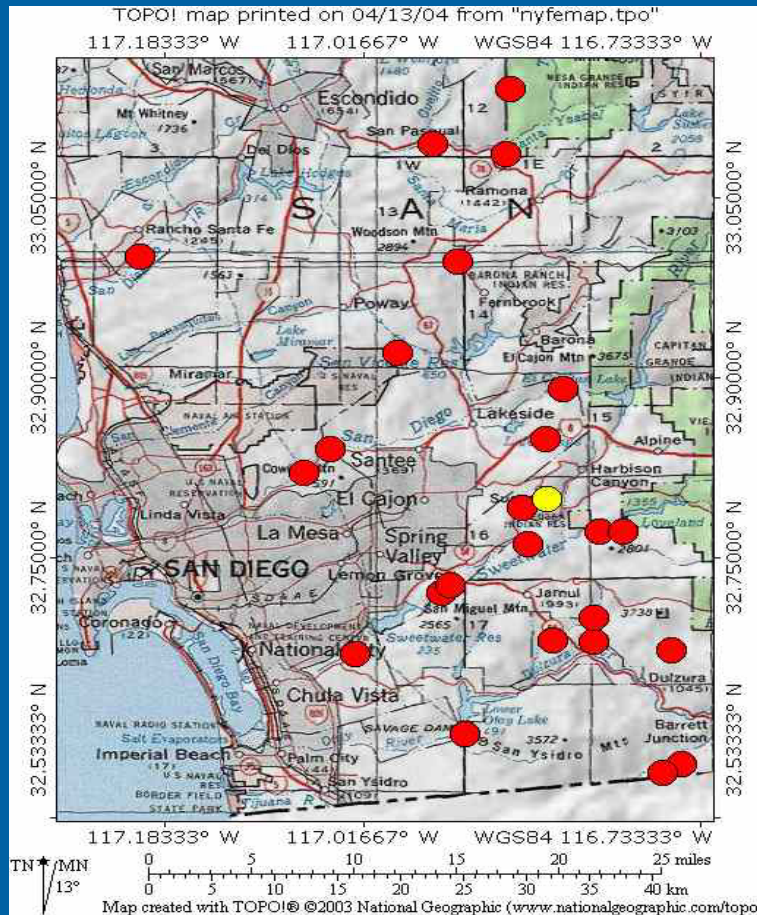
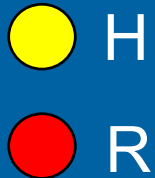


Pallid bat (*Antrozous pallidus*)

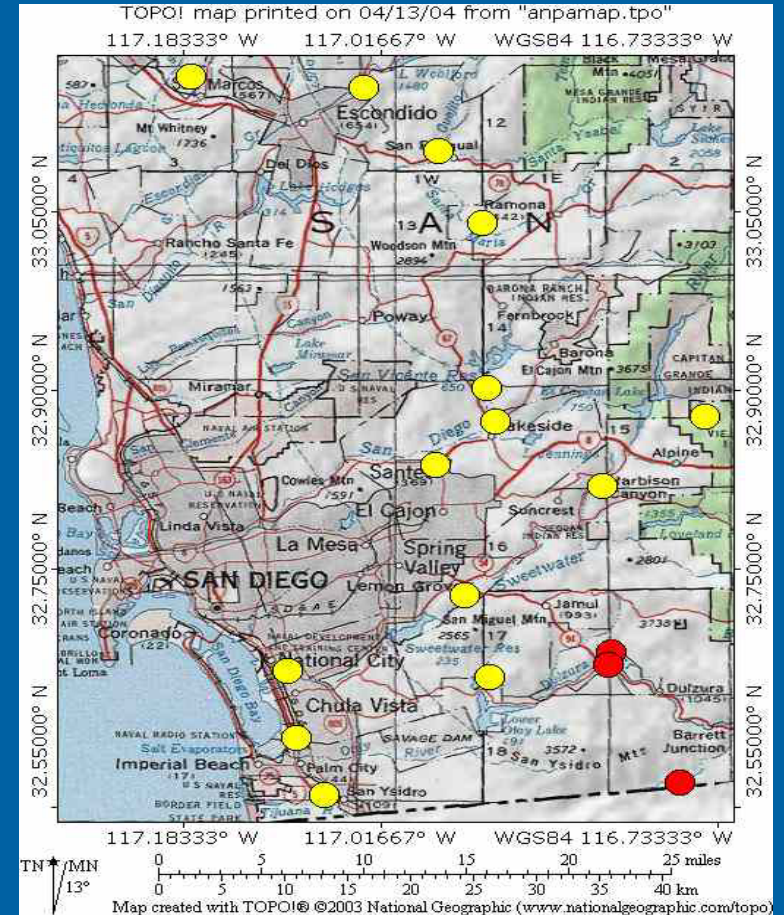


Changes in MSCP area bat community

- Most Obvious
- Pocketed free-tailed bat (*Nyctinomops femorosaccus*) appears to have experienced a range expansion
- Pallid bat (*Antrozous pallidus*) appears to have experienced range contraction



Pocketed free-tailed bat
(*Nyctinomops femorosaccus*)



Pallid bat
(*Antrozous pallidus*)



Some Conclusions

- Southern portion of MSCP preserve system supporting greatest number of bat species including several rare species (ANPA, MACA, COTO)
 - Greatest amount of contiguous, undisturbed structurally diverse land including intact riparian and upland systems
 - Many bat roosting opportunities
 - Abundance of exposed rocky habitat
 - Presence of natural and artificial caves
- Importance of coastal habitats to resident and migratory species cannot be overlooked

Western pipistrelle
(*Pipistrellus hesperus*)

More Conclusions



- Multiple survey techniques required to document all species
- Sites surveyed multiple times across seasons
- 7 species not detected due to rarity, peripheral to study area
- Functionality of MSCP area for bats complex situation
- Management strategy dependent on multi-agency involvement

Key Management Issues

- Protection of roosts
 - Mines
 - Otay Mtn
 - McGinty Mtn
 - El Monte OSP
 - Flumes and Dams
 - Bridges
 - Buildings
- Roost enhancement on preserve lands
- Preserve upland habitats along with riparian



Hoary bat (*Lasiurus cinereus*)

- **Protect pallid bat habitat (low gradient, sparse ground cover i.e. grasslands, oak savannahs, terraces**
- **More bat research!!!**

Additional Bat-related Projects

- Standardized survey protocols
- Bat call reference library
- Genetic tissue collection
- Ectoparasites
- Local bat demographics
- Effects of fire on bats
- Effects of urbanization on bats including implications of bat use of a mosaic-of-ownership landscape
- Sexual dimorphism in local bat populations



Big brown bat (*Eptesicus fuscus*)

Acknowledgements

- County of San Diego
- California Department of Fish and Game
- US Fish and Wildlife Service
- Bureau of Land Management
- City of San Diego
- San Diego Fish and Wildlife Advisory Commission
- USGS biologists



Spotted bat (*Euderma maculatum*)